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New species of *Ferreola* LEPELETIER, 1845 and *Eoferreola* ARNOLD, 1935 with key to *Ferreola* species from the Palearctic region (Hymenoptera, Pompilidae)

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Abstract: The genus *Ferreola* is revised in the West and Central Palearctic region. A key to species is given. The following species are described: *Ferreola alraeesii* nov.sp. from Oman and United Arab Emirate by male and female, holotype is a male; *Ferreola haladai* nov.sp. from Uzbekistan and Tajikistan by male and female, holotype is a male; *Ferreola pseudodenticulata* nov.sp. from Oman by male and female, holotype is a male; *Ferreola tunesiensis* nov.sp. from Tunisia by male and female, holotype is a female. The following new synonyms are proposed: *Pseudoferreola incisa* RADOSZKOWSKI, 1888 syn.nov. under *Ferreola algira*; *Pompilus peranceps* RADOSZKOWSKI, 1888 syn.nov. under *Ferreola diffinis*; *Pseudoferreola striata* RADOSZKOWSKI, 1888 syn nov. under *Ferreola orchesica*. *Pseudoferreola barrei* RADOSZKOWSKI, 1893 was new given a new combination in *Ferreola barrei*. *Eoferreola alwahaibii* nov.sp. from Oman is described by a female.

Key words: Hymenoptera, Pompilidae, *Ferreola*, *Eoferreola* new species, Palearctic region, key to species.

Introduction

The genus *Ferreola* was never revised before. New material collected in Oman by Ali Al-Jahdhami, from Tunisia collected by Christian Schmid-Egger and from the OLL collection (various locations and collectors) included several undescribed species, which are described here. We also review the hitherto known species of the genus, add unpublished records and give a key to the treated species. A complete revision of *Ferreola* in the Palearctic is not possible, because there are still some old and unclear taxa names in the literature, and corresponding types could not be examined until today. The aim of the present paper is to make working with *Ferreola* in the treated area possible and to encourage further research.

The sample from Oman also included an undescribed species of *Eoferreola*. It is described here. The genus *Eoferreola* was revised by WAHIS & SCHMID-EGGER (2002) in the western Palearctic region. The genus was unknown from Arabian peninsula until now. The Pompilidae fauna of the Arabian peninsula in general is poorly known. SCHMID-EGGER (2017) examined the fauna of the United Arab Emirates (UAE), and WAHIS (2000) the fauna of Yemen.

Material and methods

Morphological terms follow BOHART & MENKE 1976. Additionally, the following terms are used:

Malar space: Space between eye and mandible is the malar space (and not "gena" as in some older publications).

Gena means the area behind eyes (seen in lateral view), and is measured always in lateral view. Length of gena versus length of eye is measured in the middle of the eye. Other gena characteristics: Above: gena near upper eye margin, Below: gena near lower eye margin, medially: gena in the middle of the eye.

Mesosoma of Pompilidae is divided (seen dorsally from anterior) into pronotum, mesoscutum, scutellum, metanotum, metapostnotum and propodeum, the propodeum is divided into propodeal dorsum and propodeal declivity. Metapostnotum is sometimes reduced to a narrow band and not visible because it is hidden by metanotum.

Subgenital plate: the last sternite (VIII) of males.

Antennomeres (abbreviated with AS) are consequently counted from the base: scape is AS I, pedicellus is AS II, and flagellomere I is AS III. Females have 12 and males 13 antennomeres.

SMC = Submarginal cell in forewing.

All measurements of the face were done in frontal view, as are the width of face and width of the eye, always using the maximum width or diameter.

Acronyms of depositories and other institutions

For type depository see below.

Ferreola LEPELETIER, 1845

Key to males and females of the western and Central palearctic region

- 1 Clypeus (measured at longest distance) prolonged, as long as AS II+III. Vertex (dorsal view) thickened, POL = Distance between Ocellus and hind margin of head. Malar space as long as diameter of AS III. [Upper head, pronotum, mesonotum, scutellum and medial part of postnotum red, except in specimens from Spain]2
- Clypeus, vertex and malar space shorter (malar space also long in *F. auranticornis*)3
- 2 Female: Gena only with a few scattered setae. Vertex (dorsal view) large and thickened, apex somewhat bulged. Male and female: Crossing between propodeal dorsum and declivity with more or less sharp edge. North Africa, southwest Asia, southern Spain. [a female from Spain is all black]*F. algira* (LEPELETIER)
- Female: Gena below with about 30 long dark setae. Vertex not bulged at apex, somewhat shorter than in *F. algira*. Male and female: Crossing between propodeal dorsum and declivity with rounded edge. Tunisia*F. tunisiensis* SCHMID-EGGER **nov.sp.**
- 3 Malar space at least long as half diameter of AS III. [Head, pronotum, mesoscutum and scutellum red. Propodeum and abdomen black with weak bluish shimmer]4
- Malar space short, at most as long as midocellar diameter, or eye touches mandible (not examined in *F. insolita* from Sicily)5

- 4 Antenna in greater part red. Declivity of propodeum with some striae. Vertex prolonged, POL = Distance between Ocellus and hind margin of head. Yemen, Erythrea. Female unknown.....*F. auranticornis* WAHIS
- Antenna black. Declivity of propodeum without striae. Vertex short, maximum 1-2 ocellar diameters long. Kenya.....*F. purpureopruinosa* (CAMERON)
- 5 Pronotum at least as long as wide. Male: Subgenital plate narrow, with large basal process. [Crossing between propodeal declivity and propodeal dorsum rounded. Pronotum and tegulae red, remaining body and most parts of wings black. Female 18 mm, male 9-12 mm]. Northern Oman, United Arab Emirates*F. alraeesii* SCHMID-EGGER & AL-JAHDHAMI **nov.sp.**
- Pronotum shorter as wide, or larger parts of mesosoma red. [*F. haladai* nov.sp. from Uzbekistan also with prolonged pronotum, but only 9-10 mm]6
- 6 Pronotum red or black, remaining mesosoma all black. Head black except red band along inner eye margin and on vertex and gena7
- At least pronotum, mesoscutum and scutellum red or orange. Head in greater part red, except in *F. elegans*.....11
- 7 Crossing between propodeal declivity and propodeal dorsum rounded. Propodeal dorsum basally only with two more or less rounded impressions, or flat (not examined in *F. insolita*).....8
- Crossing between propodeal declivity and propodeal dorsum with sharp edge. Propodeal dorsum basally with two deep furrows in lateral third, at least as long as half propodeum9
- 8 Pronotum black. Inner eye margin above with reddish band. Wings infusate. Propodeal declivity below upper crossing somewhat hollowed out. Head, mesosoma and tergites without silver pubescence. Male: subgenital plate simple. [Apical clypeal margin widely truncate, clypeus in most specimens more or less rectangular, with rounded lower corners. Scutellum and metanotum plane. Europe to Central Asia.....*F. diffinis* (LEPELETIER)
- Pronotum red. Inner eye margin black. Wings greyish, hyaline. Propodeal declivity more or less plane. Head and mesosoma with fine, scattered silver pubescence. Tergites I-III basally with large (female) or narrow (male) greyish bands of pubescence. Male: Subgenital plate, with large basal process. Uzbekistan*F. haladai* SCHMID-EGGER new species
- 9 Geographic distribution: Sicily. Face black. Basal third of forewing hyalin. [Pronotum red]. Female unknown.....*F. insolita* WAHIS & TERZO
- Not from Sicily. Inner eye margin with red band. Forewing completely infumate. [Apical clypeal margin widely rounded. Scutellum and metanotum with median impression. Pronotum red or black]10
- 10 Geographic distribution: Northern Morocco, southern Spain. Propodeal declivity with even striation, medial striae vertical, lateral striae diagonal. Large species, female 17-20 mm, male 13-16 mm*F. orchesica* (KOHL)
- Geographic distribution: Southern Central Asia. Propodeal declivity with irregular striation. Smaller species, males 11-13 mm. Female unknown*F. barrei* (RADOSKOWSKI)
- 11 Fore wing hyaline (at least in basal half. Pronotum long, with sides concave. Tergites II-III with large basal bands of silver pubescence. Propodeum with silver pubescence. Egypt, Tunisia*F. elegans* PRIESNER
- Wings infusate. Pronotum shorter, sides not concave. No distinct silver pubescence12
- 12 Declivity of propodeum with vertical striae, nearly reaching upper margin of declivity, leaving a narrow smooth zone directly below margin smooth. Male: Subgenital plate in lateral view thick, apically truncate. Greece, eastern mediterranean area, Sudan.....*F. denticulata* TASCHENBERG
- Upper half of declivity without striae, in males more or less irregular. Male: Subgenital plate in lateral view more slender, apically pointed. Oman.....*F. pseudodenticulata* SCHMID-EGGER **nov.sp.**

Taxonomy

Ferreola algira LEPELETIER, 1845, figs 1-6

Ferreola algira LEPELETIER, 1845: 468, male, female. de Bone, Algérie (Type depository?).

Pompilus sagax KOHL, 1886: 313 (key), 325, male, holotype male (Algier, NMHW). New synonym.

Ferreola pici TOURNIER, 1895: 11. Ain Sefra (leg. Pic); WAHIS & SCHMID-EGGER 2002: 26 (synonymized with *Ferreola algira* LEPELETIER, 1845 "nec auct.")

Pseudoferreola incisa RADOSZKOWSKI, 1888: 479. Female, Andalousie, Algérie (Berlin, examined). **New synonym.**

R e c o r d s : Algeria: 1 female 30.v.1994 Hodna (OLL). Israel: 1 male 14.v.1996 10 km S Haifa, Har Carmel/Bet Oren; male 12.v.1996 5 km SSE Sede Boquer, Wadi N'Agev (CSE). 1 female 13.8.1940 Jerusalem; 1 female 18.9.1976 Mt. Meiron (OLL). Jordan: 4 female 2 males nw North Shuna, 30.iv.1996; 1 female 1.v.2006 Ajlun; 1 male 10 im N Petra (CSE); Morocco: 1 female 30.v.1995 40 im SW Ouarzazate, 10 im SW Tazenakht, 1 female 16.vi.2014 1 male 2.iv.1990 Ht. Atlas, N Tizi n'Tichka 2150 m NN [Barcoding voucher Nr.: female BC ZSM HYM 22788] (CSE); 1 female 1 male 14.v.1995 20 im N Missouri; 1 female 10.5.1995 Talmest; 1 female 32.5.1995 5 km S Tata; 1 female 3 males 16.4.1995 10 km E Guelmin; 1 female 13.5.1995 30 km E Midelt; 1 female 1 male 17.5.1995 40 km S Guercif; 9.4.1995 20 km W Boudrib; 14.4.1996 30 km E Agdz; 1 male 14.7.1932 Asni; 2 males 19.5.1995 Bouarfa, 1 male 23.5.1995 101 km E Yousoffra; male 23.5.1995 Amouguer, 50 km W Rich; 1 male 22.5.1989 Massa (OLL); 1 male and 1 female, Tanger (Berlin). Spain: 1 male 22.iv.2003 30 km SW Almeria, coast (OLL). 1 female Andalusien (type specimen of *Pseudoferreola incisa*) (Berlin). Syria: 1 female 19.iv.1982 25 km S Latakia (OLL) Tunisia: 1 female 22.6.1994 5 km N El Kef; 29.v.1994 1 female 17 im SW Kasserine; 1 female 3 males 6.vi.2000 15 km W Nefta, 1 female 13.vi.2000 E Ain Draham; 1 female 22.iii.2001 Oasis Nefta; 1 female 4 male 24.iii.2001 Tunisia, Thélèpte 35°04'N 8°33'E [Barcoding voucher Nr.: male BC ZSM HYM 22789], male 23.vi.1994 25 km S Tarbarka (CSE); 2 males 12.9.1982 Gafsa (OLL); 1 female 3.vi.1912 Tunis (Berlin). Turkey: 1 female 17.vi.2000 Harbie/Antakya (OLL).

R e m a r k : The species name "*sagax*" was used by several authors like YILDIRIM & WAHIS 2011 or PRIESNER (1955), whereas others used "*algira*" also in the past (see HAUPT 1962). Both taxa names are clearly synonymous (R. Wahis pers. comm.), but we could not find which author first synonymised both. So we do the formal synonymisation here. The situation is now more complicated by the discovery of a sibling species of *F. algira*, *F. tunesiensis* nov.sp. However, we think that both taxa names, *F. algira* and *F. sagax* refer to the here mentioned species, *F. algira*. See also remarks at *F. tunesiensis*.

In the Berlin Museum is an old female of *F. algira* from "Andalusien" with a blue handwritten label "*Pompilus incisa* Radosz., type". It agree with the description of *Pseudoferreola incisa* and may be the type specimen, although the species was described in the genus *Pseudoferreola* and not in *Pompilus*.



Figs 1-6: (1) *Ferreola algira*, female from Tunisia; (2) *Ferreola algira*, male from Tunisia; (3) *Ferreola algira*, female, face; (4) *Ferreola algira*, female, head laterally; (5) *Ferreola algira*, male from Jordan, subgenital plate; (6) *Ferreola algira*, male from Jordan, genital.

D i a g n o s i s : *F. algira* is well characterized in both sexes by the prolonged clypeus, malar space and vertex, by the clear and sharp edge between propodeal dorsum and declivity and by the lack of long pilosity on gena. The similar *F. tunesiensis* shares the long clypeus, malar space and vertex with *F. algira*, but has a long black pilosity on gena (female only) and a rounded edge on propodeum (males and females). The species varies in body size, examined females measures 10-14 mm, males 8-14 mm. In most specimens are dark red: head (but frons and clypeus may be partly black), pronotum, mesoscutum scutellum and medial part of metanotum. In a female from Syria is the mesosoma all black, read are only gena, vertex and upper inner eye margin. In males, face and clypeus in general is black, however extension of red colour of head is variable. A male from southern Morocco has underside of flagellomere orange, two other males from the same area have mid- and hindfemor red. A male from Spain is all black.

G e o g r a f i c d i s t r i b u t i o n : North Africa to Israel and Turkey.

***Ferreola alraeesii* SCHMID-EGGER & AL-JAHDHAMI nov.sp., figs 7-15**

H o l o t y p e : United Arab Emirates, male 15.vii.2015 Abu Dhabi, Al Wathba Wetland Reserve, 24.248N 54.742E leg. A. Saji & T.v.Harten in Malaise Trap (CSE).

P a r a t y p e s : United Arab Emirates 1 male, 15.iii.2015, Abu Dhabi, Al Wathba Wetland Reserve, 24.248N 54.742E leg. A. Saji & T.v.Harten in Malaise Trap (CSE); Oman 1 male 3 female 3.iv.2017, Asharqyah North, Al Qabil, Ad Dariz 22.566N 58.690E, (females: coll CSE, Al-Jahdhami and ONHM, male coll Al-Jahdhami). female 11.iv.2018 Asharqyah north, Wadi Tayeen, Ghyiadha, 23.123120 N, 58.462149 E, all. leg. Ali Al-Jahdhami.

D i a g n o s i s : The species is unique among Palaearctic *Ferreola* species by the prolonged pronotum, what is medially somewhat narrowed (dorsal view), in combination with the large body size (female: 18 -20 mm, males 9-12 mm). It is longer than wide in both sexes, whereas is is always shorter than wide in remaining species apart from *F. haladai*. The propodeum is also prolonged and longer than wide in female or as long as wide in male. The whole species appears therefore longer and more slender than remaining species. Other distinctive characters are colour pattern (black, except red pronotum), and a distinct bandlike greyish pubescence on tergite I and tergite II basally (males and females) and on tergite III basally (only male). Subgenital plate is also unique with a spinelike process basally below (fig. 14).

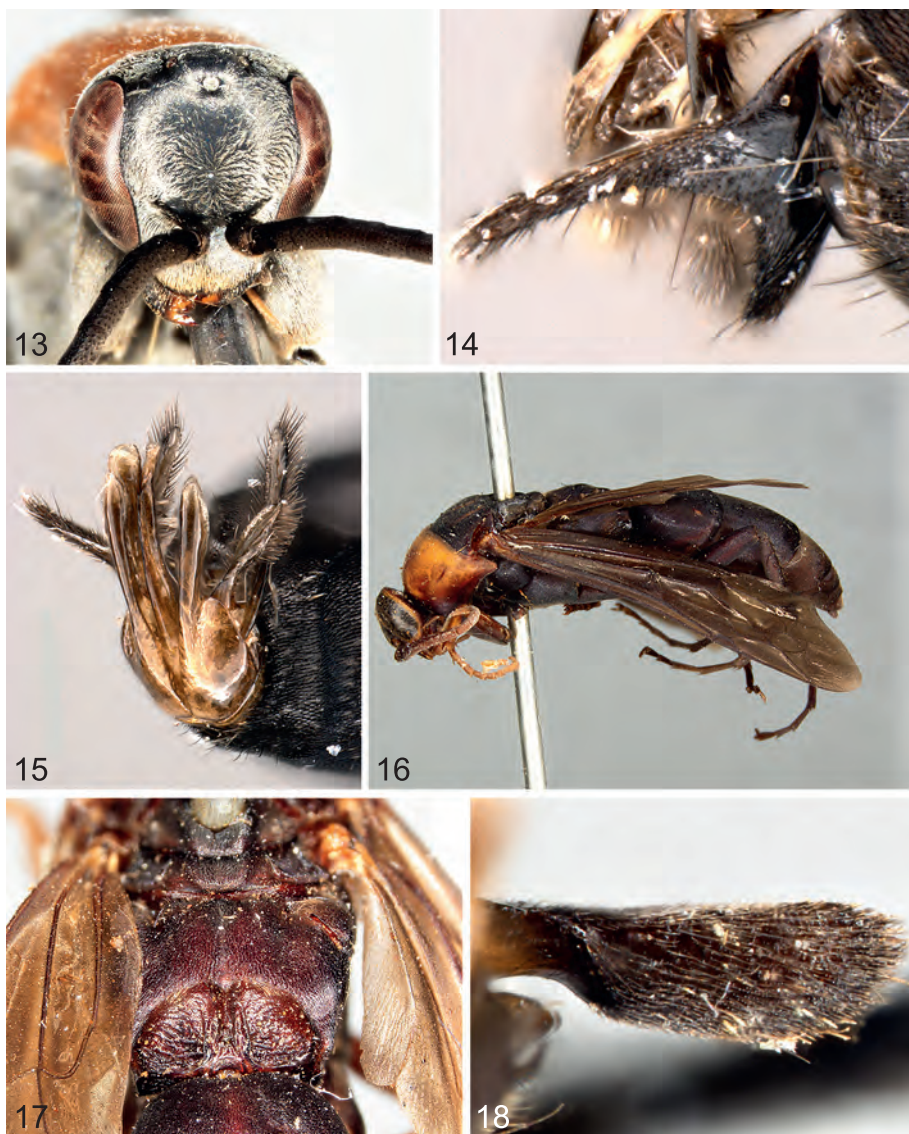
D e s c r i p t i o n o f m a l e : Holotype: Body length 8 mm. Colour: Black, pronotum and tegula red. Wings dark infusate, with violett shimmer, basal area of fore- and hindwing greyish transparent. Basal third of tergite I with grey pubescence. Tergite II and III basally with band of grey pubescence, see. fig. 8. Remaining terga with very fine and short black/bluish apressed pubescence. Morphology: Apical clypeal margin widely rounded, margin curved down versus apex, remaining clypeus flat. Malar space very small, eye nearly touches mandible. Gena medially 2x as long as midocellar diameter. Vertex length behind ocelli = 0,5x POL. Pronotum measured medially in dorsal view, 1,0x as long as wide. Lateral sides of pronotum medially distinctly emarginated. Crossing between propodeal dorsum and declivity rounded, declivity with finely striate, with dense semierect pubescence. Tergites slender, tergite I 1,0 as long as maximal wide. SMC III as large SMC II. SMC III above 0,5x as long as SMC II above, below similar in length. Subgenital plate spinelike, with triangular and apically pointed appendix below, with long brown setae. Genital see fig. 15.



Figs 7-12: (7) *Ferreola alreesii*, female paratype; (8) *Ferreola alreesii*, male holotype; (9) *Ferreola alreesii*, female face; (10) *Ferreola alreesii*, female head laterally; (11) *Ferreola alreesii*, female head and mesosoma, dorsally; (12) *Ferreola alreesii*, female propodeum from behind.

Variation in males: Body length 10 mm and 13 mm. Frons in the larger male with some erect pale setae. Wing venation in both paratypes as in female.

Description of females: Body length 18-20 mm. Colour: Black, pronotum and tegula red. Wings dark infuscate, with violet shimmer, hindwing in basal third greyish transparent. Head and mesosoma with appressed greyish pilosity, not hiding integument. Apical clypeal margin and mandible with long and dense, greyish pubes-



Figs 13-18: (13) *Ferreola alreesii*, male holotype, face; (14) *Ferreola alreesii*, male holotype, subgenital plate; (15) *Ferreola alreesii*, male holotype, genital; (16) *Ferreola barrei*, male holotype; (17) *Ferreola barrei*, male holotype, propodeum from behind; (18) *Ferreola barrei*, male from Iran, subgenital plate.

cence, longest setae 0,5-0,8x as long as diameter of midocellus. Frons, backside of head and propleuron with some long erect pale setae. Pubescence on propodeal declivity somewhat longer and semierect. Basal third of tegite I and bandlike patch on tergite II basally with dense, greyish pubescence. Remaining terga with very fine and short black/bluish apressed pubescence. **Morphology:** Apical clypeal margin widely rounded, margin curved down versus apex, remaining clypeus flat. Malar space not present, shorter than 0,5x diameter of midocellus. Gena (measured medially, in lateral view) 0,6x as long as eye. Vertex length behind ocelli = POL. OOL = 1.1x POL. Pronotum measured medially in dorsal view, 1,2x as long as wide. Lateral sides of pronotum medially distinctly emarginated. Propodeum, measured medially, 1.1x as long as wide. Crossing between propodeal dorsum and declivity rounded, declivity with some irregular striae, forming each a circle laterally. Tergites slender, tergite I 1,1x as long as maximal wide. Tergites and sternites V and VI with long, black setae. SMC III larger than SMC II. Both cells are similar in length above, and SMC III is below 1,2x as long as SMC II. Foretarsi without spinulation.

Geographic distribution: Northern Oman and United Arab Emirates.

Etymology: The species is named in honour of Mr. Ali Ahmed Al-raeesi, Teacher of entomology, Department of crop science, Collage of Agriculture and marine science, Sultan Qaboos University, Muscat, Oman.

***Ferreola auranticornis* WAHIS, 2000**

Ferreola auranticornis WAHIS, 2000: 91. Male, holotype male, Erythrea; paratype Yemen (coll. Wahis).

Diagnosis: *F. auranticornis* is unique by the orange red antenna in combination with prolonged gena and head (behind eyes, dorsal view). The species shares the remaining colour pattern with *E. pseudodenticulata* and *E. denticulata*. It is also a very small species with 9 mm body length, whereas remaining species of *E. pseudodenticulata* measures at least 12 mm. See WAHIS (2000) for detailed description. The female is undescribed.

Geographic distribution: Yemen, Erythrea.

***Ferreola barrei* (RADOSZKOWSKI, 1893), figs 16-19**

Pseudoferreola barrei RADOSZKOWSKI, 1893: 61. Male, holotype male, Serax (Berlin). Examined. **New combination.**

Records: Turkmenistan: male holotype, Serakhs, 36.53N 61.22E without date (Berlin). Afghanistan 1 male SW Afg., Hilmend River, Lashkar Gar 14.v.1957 (CSE). Iran 1 male 9.vi.2010 Fars prov., Komher 30°47'N 51°86'E, 2380 m; 1 male 23.v.2005 Elburz, Mayamey (OLL).

Remark: In the coll. Berlin is an old *Ferreola* male with an handwritten label "*barrei*" and a red printed "type" label. It agrees perfectly with the (short) original description of *Pseudoferreola barrei* by RADOSZKOWSKI (1893). For that reason we treat it as the holotype of *Ferreola barrei*. The species is valid and represents a hitherto unknown Central Asian *Ferreola* species close to *F. orchesica* from the western Mediterranean area. The female is still unknown, but we can assign some males from Iran and Afghanistan with the type of *F. barrei*. The type location "Serax" is now Serakhs or Sarakhs in southern Turkmenistan at 36.53N 61.22E (A. Antropov pers. comm.). A. Antropov also agrees that the label most probably is from O. Radoszkowski.



Figs 19-24: (19) *Ferreola barrei*, male from Iran, genital; (20) *Ferreola denticulata*, female from Sudan; (21) *Ferreola denticulata*, male from Greece, Peloponnes, by H. Wiesbauer; (22) *Ferreola denticulata*, male from Greece, head and mesosoma dorsally; (23) *Ferreola denticulata*, male from Greece, head laterally; (24) *Ferreola denticulata*, male from Greece, subgenital plate.

Diagnosis: *Ferreola barrei* is characterized by the following character combination: short malar space, short vertex and pronotum, crossing between propodeal declivity and propodeal dorsum with prominent and sharp edge, declivity with distinct striation. Pronotum is red or black. Body length measures 11-13 mm. The female is unknown. The species is similar to *F. orchesica* and can be recognized by smaller size (*F. orchesica* male measures 13-16 mm), by a somewhat more irregular striation of propodeal declivity and by a distinctive colour pattern of upper face: red band of inner eye margin is not connected with red band of vertex, whereas it is connected in all examined *F. orchesica*. Two of the examined males (type specimen and male from Fars prov.) have pronotum and medial spot on mesoscutum red, the remaining have pronotum and mesoscutum all black.

Geographic distribution: Afghanistan, Iran, Turkmenistan.

***Ferreola denticulata* TASCHENBERG, 1869, figs 20-25**

Ferreola denticulata TASCHENBERG, 1869: 72. Holotype female Sudan, "Chartum" [= Khartoum] (Halle).

Sphex dimidiata (FABRICIUS, 1793, nec. VAN DER LINDEN, 1827), misidentification, is *Schistonyx perezi* (TOURNIER, 1895), (see WAHIS & GROS 2000).

Records: Greece: 1 male 1 female 24.vii.1965 Alt Korinth; 1 male 31.v.2006 Samos, Phytagorio (OLL): 1 male 15.ix.2014 Lesbos, Scala Polichnitos (CSE); 1 female vi.1971 Insel Rhodos; 1 female 12.viii.2003 Rhodos, Tsambika beach (CSE); 2 females 21.viii.1925 Kithira Island (Berlin); male 10.v.2014 Peloponnes, Kalogria, photo by H.Wiesbauer (fig. 21). Israel: 1 male 16.vi.1965 En Gedi; 1 male 9.iv.1986 Qumran (OLL) Sudan: male female 8.iii.1994 150 km SE Khartoum, Narga (CSE).

Diagnosis: *Ferreola denticulata* can be recognized by its large body size (females 17-21 mm, one female only 15 mm, males 12-18 mm) in combination with a distinctive colour pattern: Head (apart the black area around ocelli), pronotum, scutellum and metanotum are orange-yellow, remaining body black. Wings are dark infusate. Propodeal declivity is evenly spoke-like striate, striae originate on medial part of declivity base, and reach the edge between declivity and propodeal dorsum, leaving a small zone behind edge smooth. The similar *F. pseudodenticulata* **nov.sp.** is smaller (females 13.5-16 mm, males 9-13 mm), striae of propodeal declivity are shorter, more irregular and cover only the lower half of declivity.

Geographic distribution: Greece (mainland and islands), Israel, Sudan. Cyprus; Algeria/Hoggar (WAHIS & TERZO 1996, as *Ferreola dimidiata*), Egypt (PRIESNER, 1955: 189 as *Platyderes dimidiatus* Lind.), Turkey (ÖZBEK et. al. 2000, as *Ferreola dimidiata* (VAN DER LINDEN, 1827)).

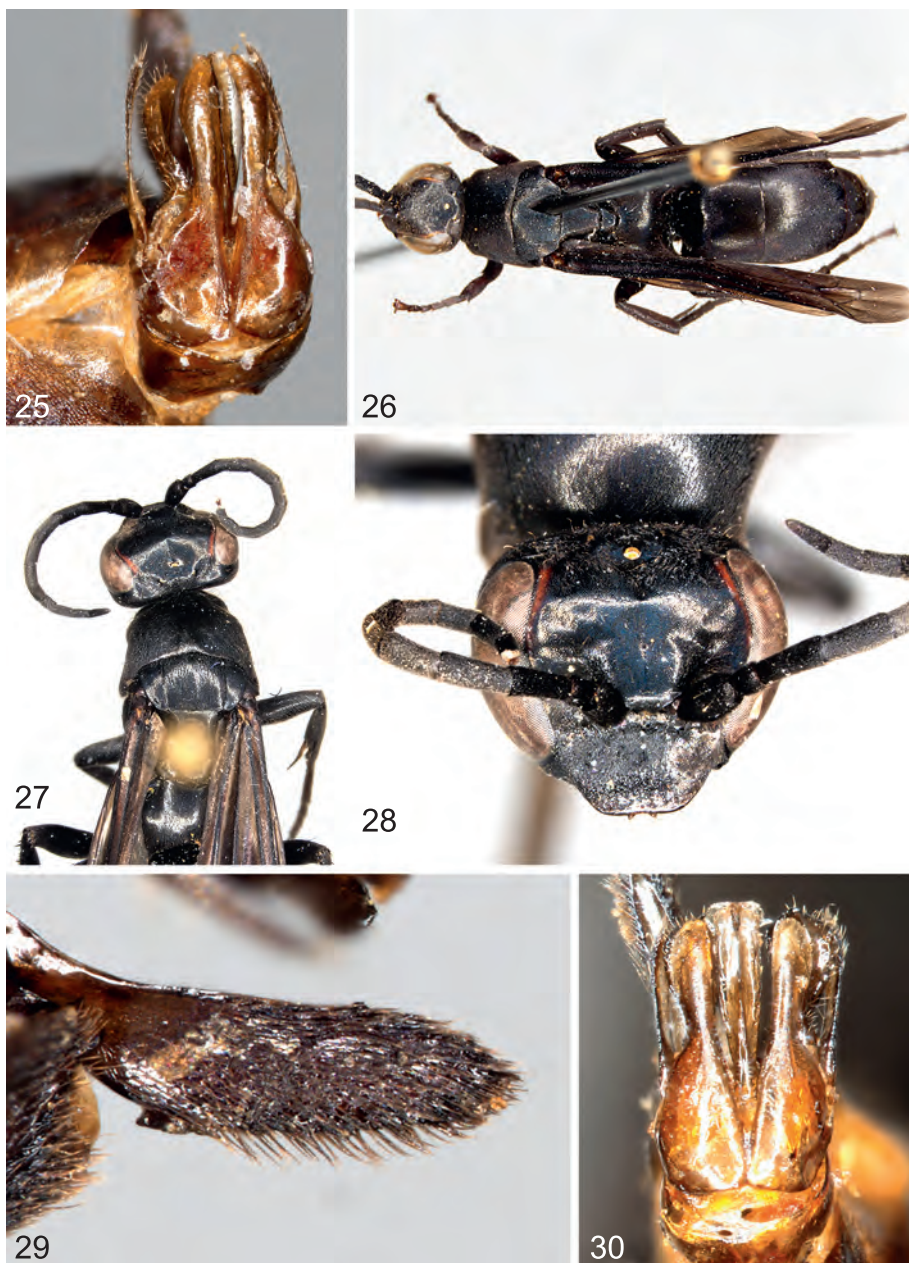
***Ferreola diffinis* (LEPELETIER, 1845), figs 26-30**

Anoplius diffinis LEPELETIER, 1845: 454, male. Europe (Musée de M. Alexandre Lefebvre).

Pompilus peranceps RADOSZKOWSKI, 1888: 466, male female, Andalousie (Berlin). Examined, Lectotypus (female) designated by R. Wahis. **New synonym.**

Records: France: 1 female 12.9.1987 Perpignan, Argèles (CSE). Greece: 1 male 31.5.2006 Samos, Phytagorio (CSE); Kroatia: 1 male 15.6.1965 Insel Mijet, Govedjari (CSE). Spain: 1 female 19.6.1947 Cadiz, 3 km N Rota (CSE). Turkey: 1 female 22.6.1998 SE Milas (CSE)

Diagnosis: *F. diffinis* is the only black coloured *Ferreola* species in Europe and paleaartic Asia (with red inner eye margin) with rounded crossing on propodeum.



Figs 25-30: (25) *Ferreola denticulata*, male from Greece, genital; (26) *Ferreola diffinis*, male from Croatia; (27) *Ferreola diffinis*, female from Greece, head and mesosoma dorsally; (28) *Ferreola diffinis*, female from Greece, face; (29) *Ferreola diffinis*, male from Croatia, subgenital plate; (30) *Ferreola diffinis*, male from Croatia, genital.



Figs 31-36: (31) *Ferreola elegans*, male; (32) *Ferreola elegans*, male, head and mesosoma dorsally; (33) *Ferreola elegans*, male, subgenital plate; (34) *Ferreola elegans*, male, genital; (35) *Ferreola haladai*, female paratype; (36) *Ferreola haladai*, male holotype.

F. orchesica from southern Spain and *F. barrei* from southern Central Asia also may occur in a black form, but propodeal declivity is separated by a sharp edge from propodeal dorsum in both species. Malar space is as long as longest diameter of midocellus, clypeus, gena and vertex are not prolonged, and propodeal declivity has some irregular striation.

G e o g r a f i c d i s t r i b u t i o n : Europe to Turkey and Central Asia, southwards to Israel, widespread, but rare.

***Ferreola elegans* (PRIESNER, 1955), figs 31-34**

Platyderes elegans PRIESNER, 1955, 187. Male and female, type specimens and type location not indicated. Egypt, several locations.

R e c o r d s : Tunisia: 1 male 11.ix.2007 2 km W Gabes, Chenini, on Tamarix (CSE).

D i a g n o s i s : (Description of female taken from PRIESNER 1955): The species is characterized by colour pattern with pronotum, mesoscutum and scutellum red, and head all black. In the examined male the is anterior part of mesopleuron is also red. Tergites I-III have a large greyish band of pubescence basally. Female pronotum is prolonged, however in the original description (PRIESNER 1955) is not detailed information about length. Tergite I is prolonged, and wings are transparent in basal half and strongly infusate in apical half. The examined male has all wings transparent. The crossing between propodeal dorsum and declivity is rounded, and malar space is short. From this description the female of *F. elegans* has some similarities with *F. alraeesii* from Arabia and *F. haladai* from Central Asia. Both species differ clearly by colour pattern, wing colour and by body length (female of *P. elegans* 9-15 mm, *F. alraeesii* 18 -20 mm), see description. The examined male of *P. elegans* measures 7.5 mm, subgenital plate is simple and without any process (with long process in *F. alraeesii* and *F. haladai*).

G e o g r a f i c d i s t r i b u t i o n : Egypt, Tunisia.

***Ferreola haladai* SCHMID-EGGER nov.sp., figs 36-40**

H o l o t y p e : Uzbekistan male 12.v.1994 Papngan, 20 km NW Kokand 41.2N 70.6E, leg. Ma.Halada /OLL). [id. as *Homonotus collaris* by H. Wolf, 1987].

P a r a t y p e : Tajikistan female viii.2000 Varzob riv., Zogar – Varzob, leg. V. Gurko (OLL).

D i a g n o s i s : *H. haladai* is characterized by a slender body (pronotum and tergite I at least as long as wide), pronotum medio-laterally with wide emargination (pronotum is basally and apically wider than medially) and with a basal process on male subgenital plate. By these characters is it similar to *F. alraeesii* n.sp. and both species form a separate species group without doubt. However, the subgenital process is rounded in *F. haladai*, and spine-like and pointed in *F. alraeesii*. Also, *F. alraeesii* is much larger than *F. haladai* (see description). *F. haladai* is also characterized by colour pattern. It is all black with pronotum red. Wings are transparent, and crossing between propodeal dorsum and declivity is rounded.

D e s c r i p t i o n o f m a l e , h o l o t y p e : Body length 7.5 mm. Colour: Black, pronotum red, with medial black longitudinal spot in apical half. Head and mesosoma covered with fine and scattered silver pubescence, propodeal dorsum without pubescence. Declivity of tergite I, base of tergite II and III with narrow band of greyish pubescence, band on tergite II as large as length of AS III. Wings transparent. grey.



Figs 37-42: (37) *Ferreola haladai*, male holotype, head and mesosoma dorsally; (38) *Ferreola haladai*, male holotype, propodeum, from behind; (39) *Ferreola haladai*, male holotype, subgenital plate; (40) *Ferreola haladai*, male holotype, genital; (41) *Ferreola orchesica*, female; (42) *Ferreola orchesica*, male; head and mesosoma dorsally.

Morphology: Apical clypeal margin widely rounded. Malar space very short, as long as half midocellar diameter. Gena and vertex short. crossing between propodeal dorsum and declivity rounded, declivity with dense striation. Subgenital plate with large, U-shaped process basally below.

Description of female: Body length 10 mm. **Colour:** Black, pronotum red, tegula and basal sclerite of fore wing reddish. Tergite I-II with grey band of pubescence, as large as half length of tergite. Wings brownish, and transparent (darker than in male). **Morphology:** Apical clypeal margin widely rounded. Malar space present, someone shorter than midocellar diameter. Gena and vertex long, genae 0,6x as long as width of eye. Crossing between propodeal dorsum and declivity rounded, declivity with dense pubescence, structure not visible due to preparation of specimen.

Geographic distribution: Uzbekistan, Tajikistan.

Etymology: The species is named in honour to Marek Halada, a Czech entomologist, who collected the holotype specimen.

***Ferreola insolita* WAHIS & TERZO, 1996**

Ferreola insolita WAHIS & TERZO, 1996: 214, male holotype, Sicily (Wahis).

Diagnosis: The male of *F. insolita* is characterized by a black body with blue reflexions and with red pronotum, by a sharp edge between propodeal declivity and propodeal dorsum, and by basally transparent wings. There are no bands of pubescence on tergites. The holotype measures 11 mm. For detailed description see WAHIS & TERZO (1996).

Geographic distribution: Sicily (Italy), only known by the holotype.

***Ferreola orchesica* (KOHLE, 1886), figs 41-44**

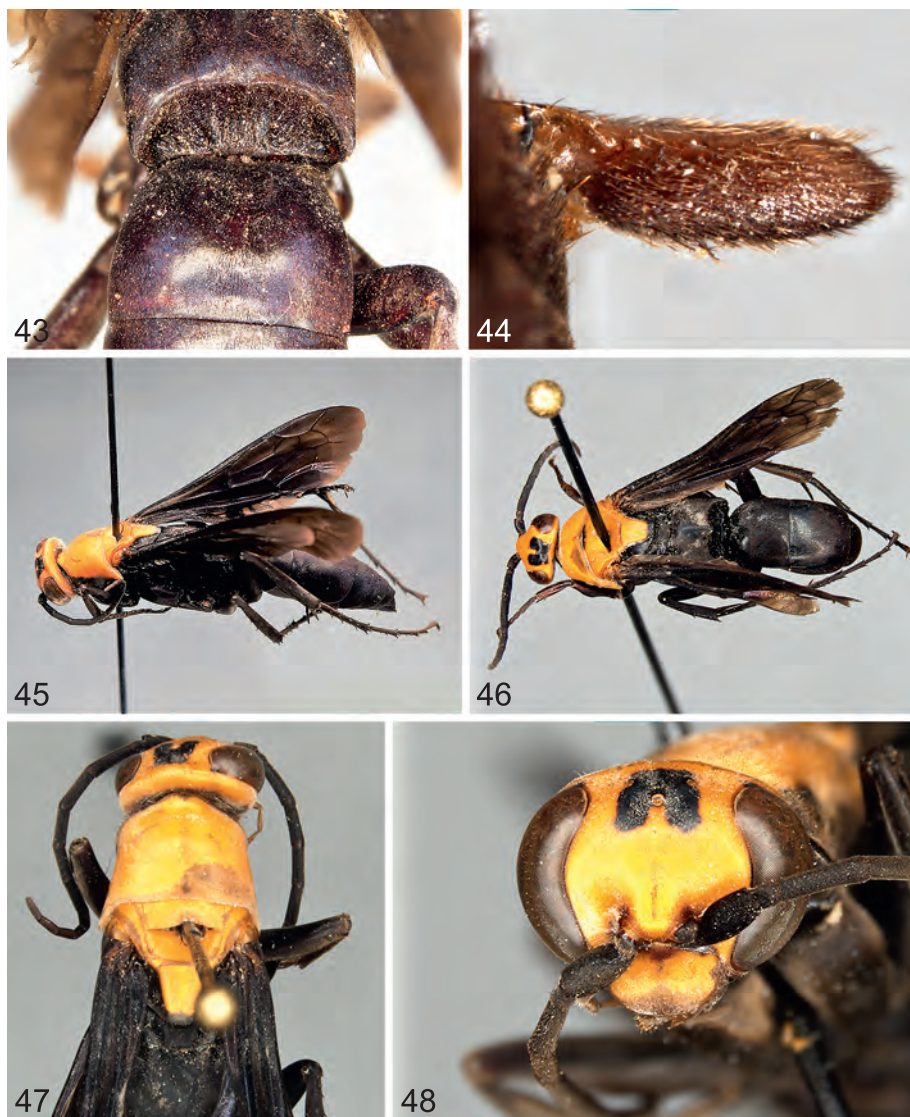
Pompilus orchesicus KOHL, 1886: 313 (key), 326, male Tanger (Wien).

Pseudoferreola striata RADOSZKOWSKI, 1888: 478, male female, Andalousie (Berlin). Examined, Lectotypus female, designated, **new synonym.** WOLF & ASSUNÇÃO DINIZ 1970: 21 (Taxonomy).

Records: Spain: 1 female, 5 males "Lusit. Andal." [old handwritten labels, means Lusitanien, Andalousie]. One male with red type label and handwritten label "striata" is designated as Lectotype of *Pseudoferreola striata* RADOSZKOWSKI, 1888]; 1 female Carboneras 3.x.1981 (CSE).

Remark: *Pompilus orchesicus*, described from northern Morokko and *Pseudoferreola striata*, described from southern Spain are similar in morphology and are therefore conspecific in our opinion. The colour of pronotum is variable, and the species occur in a form with red and with black pronotum. Already Wahis (on www.fauna-europea.org) mentions only *F. orchesica* from Spain and therefore treats *P. striata* a synonymous. However, *Pseudoferreola striata* was never synonymised formally, what will be done here: It is a new synonym of *Ferreola orchesica*.

In the Berlin Museum are two males and a female of "*Pseudoferreola striata*" with old handwritten labels "Andalusien". One male is labelled with a blue handwritten label "*Paraferreola striata* RADOSK. type.". We designate this male as lectotype of *P. striata*, because RADOSZKOWSKI (1888: 478) described male and female and did not mention a type specimen. The female from Berlin collection is not from the type series, because it



Figs 43–48: (43) *Ferreola orchesica*, male; propodeum, from behind; (44) *Ferreola orchesica*, male; subgenital plate; (45) *Ferreola pseudodenticulata*, female holotype; (46) *Ferreola pseudodenticulata*, male paratype; (47) *Ferreola pseudodenticulata*, female holotype, head and mesosoma dorsally; (48) *Ferreola pseudodenticulata*, female holotype, face.

has a black pronotum, but the type female has a red pronotum from the description. The other male has only unreadable labels and probably also does not belong to the type series.

D i a g n o s i s : The species can be recognized by its large body size (female 17-

20 mm, male 13-18 mm) in combination with a sharp crossing between propodeal dorsum and declivity. The species may be all black or has a red pronotum. It is distribution area occurs also *F. algira* with prolonged clypeus and vertex (short in *F. orchesica*) and in Spain *F. diffinis*. The latter is smaller and has a rounded crossing on propodeum. Wings of *F. orchesica* are dark infumate, malar space, vertex and gena are narrow, and declivity of propodeum is distinctly striate. Inner eye margin with large red band.

Colour variation: The type specimens (*P. striata* female from Spain in RADOSZKOWSKI, 1888, and *P. orchesicus* male from Morocco in KOHL, 1886) have each a red pronotum. However, pronotum is all black in four additional examined males from Spain, apart from one male with some red traces on pronotum. One examined female from Spain has pronotum red, the other pronotum black. Also WOLF et al. (1970) mention an all black female from Spain.

Geographic distribution: Morocco, southern Spain.

***Ferreola pseudodenticulata* SCHMID-EGGER nov.sp., figs 45-50**

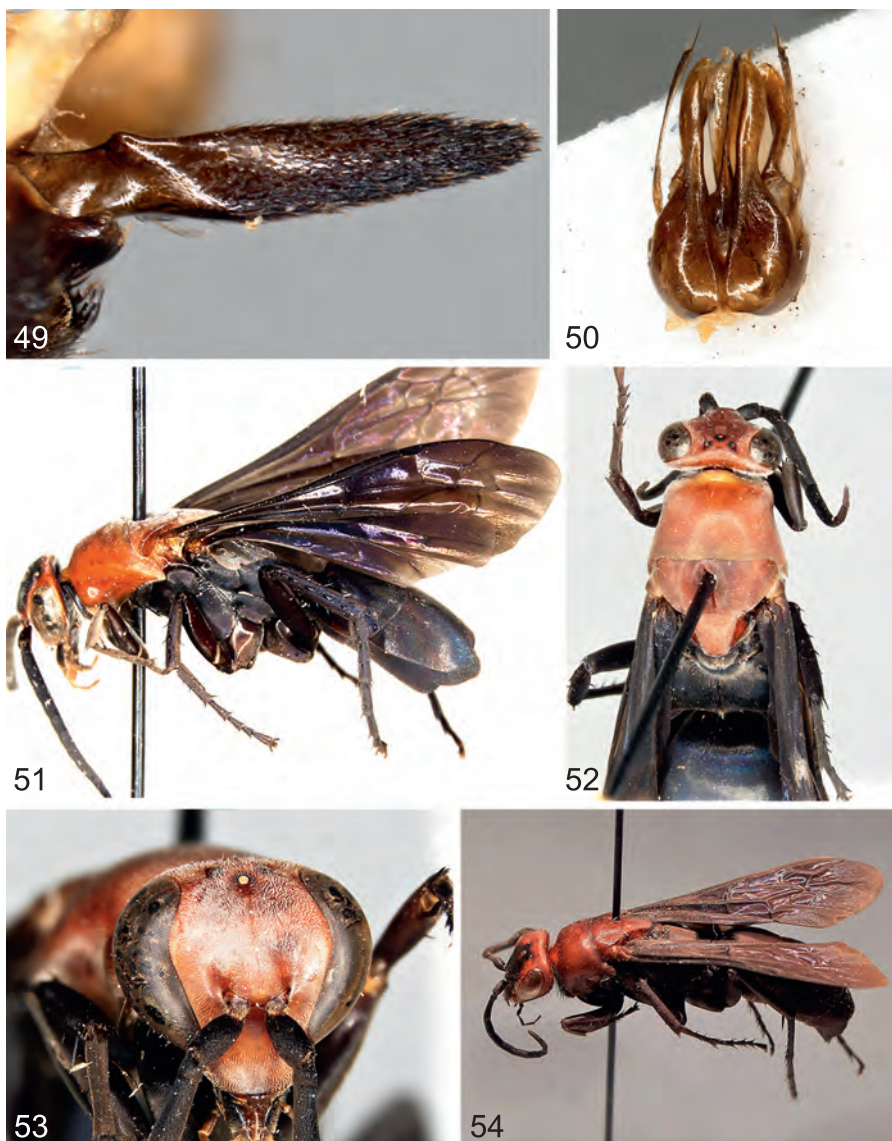
Holotype: Oman, female, 14.iii.2015 10 km SE Sur, leg. M. Snizek (OLL).

Paratypes: Oman, 2 females 15.iii.2015 17 km W Sur, leg. M. Snizek (OLL); female 6.x.2013; 1 male 14.iii.2015 20 km SW Sur leg. M. Snizek (OLL); female Dhofar prov., Rakhyut 16°45'N 63°24'E, leg. J. Halada (OLL); male 7.ix.2007 Oman, Dhufar, Wadi Al Mugsayi, leg. A. Jaki (OLL).

Diagnosis: *F. pseudodenticulata* resembles *F. denticulata* and can be recognized by a partly smooth propodeal declivity, which is distinctly striate in *F. denticulata*. This character is more variable in both examined males, however *F. denticulata* has always more distinct striae than *F. pseudodenticulata*, which reach the upper margin of declivity (or nearby). Also, *F. pseudodenticulata* is in average somewhat smaller as *F. denticulata*.

Description of female: Holotype: Body length 16 mm. **Colour:** Orange yellow are: head except black U-formed spot around ocelli, pronotum except lateral declivity, mesoscutum, tegula, metanotum except lateral and apical margin. Mandible, apical clypeal margin and malar space brown. Antenna and spot below antenna black. Remaining body black, wings infusate, black, with weak violett shimmer. Yellow parts of mesosoma with very weak and scattered short pubescence. **Morphology:** Apical clypeal margin widely rounded. Malar space narrow, as long as half hindocellar diameter. Vertex (dorsal view) as wide as diameter of FG III. Gena as wide as diameter of FG I. SMC II above as long as SMC III, below somewhat shorter than SMC III. Declivity of propodeum separated by propodeal dorsum by keel-like edge, medially and laterally with large tooth. Declivity somewhat hollowed out, its upper half smooth with some microstructure, lower half with some indistinct striae. Mesopleuron near border to metapleuron and lower outer area on propodeum laterally with some striae. Metanotum apico-medially somewhat impressed.

Variability in female paratypes: Body length 13.5-16 mm. Agree with holotype, apart from the length of SMC III what is above in all paratypes smaller as SMC II. Striation of propodeal declivity is variable, but reaches maximal the upper third of declivity. Striae are never as long and distinct as in *F. dimidiata*.



Figs 49-54: (49) *Ferreola pseudodenticulata*, male paratype, subgenital plate; (50) *Ferreola pseudodenticulata*, male paratype, genital; (51) *Ferreola purpureopruinosa*, male; (52) *Ferreola purpureopruinosa*, female, head and mesosoma dorsally; (53) *Ferreola purpureopruinosa*, female, face; (54) *Ferreola tunesiensis*, female holotype.

Description of male: Body length 9 mm and 13 mm. The male agree in all details with the females, with the exception of male characteristics (antenna, last sternites). AS XIII somewhat longer than AS XII.

Geographic distribution: Oman.

E t y m o l o g y : The species is named about the close relationship with *F. denticulata*.

***Ferreola purpureopruinosa* (CAMERON, 1912), figs 51-53**

Homontus purpureo-pruinosa CAMERON, 1912: 394. Female, holotype female, Dima (Kongo).

R e c o r d s : Kenya: 1 female 2 males 2.xii.1996 Voi (OLL).

R e m a r k : The species has an afrotropical distribution and reaches in the north northern Kenya. It is included in the key, because it may also be occur in southern Arabia or in southern Egypt.

D i a g n o s i s : *F. purpureopruinosa* is characterized by colour pattern (head, pronotum, mesoscutum, and scutellum red, remaining body black with distinct blue shimmer) in combination with a long malar space (half as long as POL), and a smooth and finely grainlike sculptured propodeal declivity with distinct blue shimmer. Propodeal declivity is below separated by prominent edge from propodeal dorsum. Examined female measure 12 mm, males 8-10 mm. The males have face partly black, and the propodeal transverse edge carry a dense row of long and fine yellow setae.

G e o g r a f i c d i s t r i b u t i o n : Widespread in tropical Africa.

***Ferreola tunesiensis* SCHMID-EGGER nov.sp., figs 54-60**

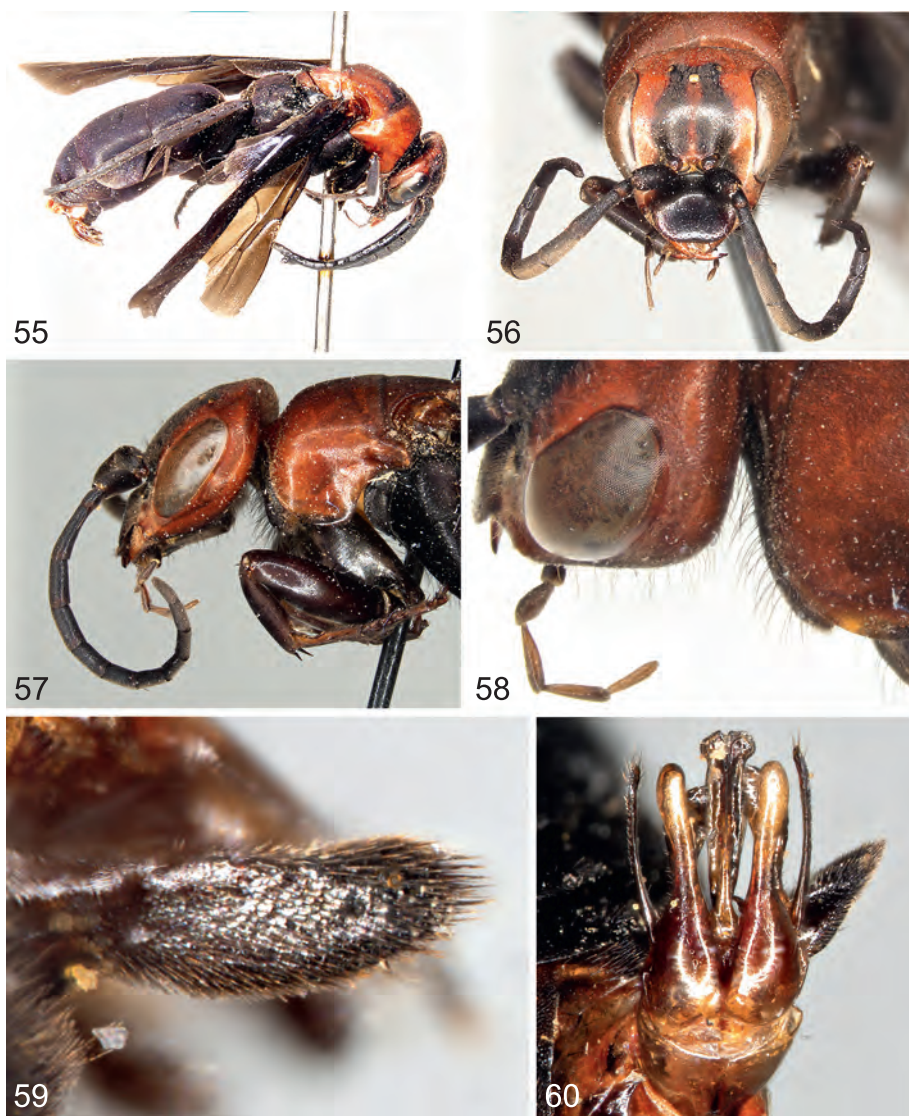
H o l o t y p e : Tunisia female 9.iv.1998, Nefta, leg K. Denes jr. [id. as *Ferreola sagax*, det. 2004 Wolf] (OLL).

P a r a t y p e s : Tunisia 2 females 8.vi.2000, 15 km W Nefta, 33°50'N 07°43'E (leg. et coll. CSE); 1 male 24.iii.2001 Thélépte 35°04'N 8°33'E [Barcoding voucher Nr. BC ZSM HYM 22790] (leg. et coll. CSE).

R e m a r k : Among the examined females of *F. algira* is a small series of different looking specimens from southern Tunisia. They represent a hitherto unknown and distinct species. The morphological results will be supported by genetic data. A male from Thélépte differ from two other specimens (male and female, also from Thélépte) distinctly by genetic data (barcoding gene, COI, Schmid-Egger in prep.), what confirms its state as a valid species. Both species, *F. tunesiensis* and *F. algira*, occur sympatrically in Tunisia.

The true identity of *F. algira*, described from Algeria, could not be verified, because type specimens were not available to us. However, we treat the more common and widespread species as *F. algira* to avoid a confusion with the previous treatment of authors. Both species are clearly defined here to make a identification possible at least in females in most males. *F. sagax*, described by a male from Algier, is a synonym of *F. algira*, because Kohl (1986: 325) mentions the sharp propodeal edge in his description, what excludes the new species, *F. tunesiensis*.

D i a g n o s i s : *F. tunesiensis* nov.sp. is similar to *F. algira* and differs by the following female characters: gena with about 30 long black setae, longest setae nearly as long as AS 11. Gena of *F. algira* without pilosity or has a few, shorter setae only. Also, pilosity of forecoxa and mesosternum is longer and much denser in *F. tunesiensis* compared to *F. algira*. Vertex laterally (behind eyes, dorsal view) is narrower and more rounded in *F. tunesiensis* as in *F. algira*. It is always somewhat thickened in outer corner in *F. algira*. The limitation between propodeal dorsum and propodeal declivity consists in a more or less rounded edge in *F. tunesiensis*, and is with sharp and somewhat prominent edge in *F. algira*. The only examined male of *F. tunesiensis* has a rounded limitation between propodeal dorsum and declivity, without any edge (apart from lateral propodeal teeth).



Figs 55-60: (55) *Ferreola tunesiensis*, male paratype; (56) *Ferreola tunesiensis*, female holotype, face; (57) *Ferreola tunesiensis*, female holotype, head laterally; (58) *Ferreola tunesiensis*, female holotype, setae on gena; (59) *Ferreola tunesiensis*, male paratype, subgenital plate; (60) *Ferreola tunesiensis*, male paratype, genital.

Description of female: Holotype: Body length 14 mm. **Colour:** Head including mandible dark red with the following parts black: apex of mandible, clypeus, a band each between antennal socket and ocellar area, leaving a narrow red band inbetween. Antenna black. Pronotum, mesoscutum, metanotum, tegulae red, remaining body black. Wings black, infuscate. with violet shimmer. Clypeal base and lower face

with scattered thin yellow pubescence. Gena with appr. 30 long erect setae, longest setae as long as length of AS XI. Propleuron, fore coxa and mesosternum also with long setae, shorter than setae on gena, directed backwards. Morphology: Apical clypeal margin nearly straight. Clypeus shiny, with scattered fine punctation. Malar space long, as long as OOL (somewhat shorter than AS XI). Clypeus prolonged, as long as AS II+III. POL = 1,3x as long as distance between hindocelli and margin of vertex. Gena (measured medially, in lateral view) also large as eye. Crossing between propodeal dorsum and declivity with rounded edge, propodeal dorsum laterally with two large teeth, and deep U-shaped emargination in between. Propodeal declivity very fine grainlike punctured. SMC III above short, as long as diameter of midocellus. SMC II above large, as long as high. Remaining characters similar to *F. algira*.

Variation of female paratypes: Body length 14 mm and 16 mm. Black colour of face is reduced in one female to a black spot around ocellar area. Clypeus is also red in this female, and pilosity of gena is reddish instead of black. Hindfemora are somewhat reddish in both paratypes.

Description of male: Body length 10 mm. Colour: Red are: Gena, vertex behind ocelli, pronotum except collar, mesoscutum except large anterior spot, scutellum, medial part of metatotum. Frons, gena, propleuron and forecoxa with long, dense and black pilosity, longest setae as long as diameter of midflagellomeres. Malar space half as long as POL. Gena (measured medially, in lateral view) 0,55x as long as eye, below distinctly narrowed. For form of clypeus and length of AS see fig. 55. Otherwise similar to female, propodeal declivity not plane, somewhat waved.

Geographic distribution: Southern Tunisia.

Etymology: The species is named after its origin, Tunisia.

***Eoferreola* ARNOLD, 1935**

***Eoferreola alwahaibii* SCHMID-EGGER & AL-JAHDAMI nov.sp., figs 61-63**

Holotype: Oman, female 10.xi.2017 Dhufar, Taqa, Ein Hamran, 17°05'55.0"N 54°16'58.0"E, leg. Ali Al-Jahdhami (ZSM).

Diagnosis: The species is unique among western palaearctic species of *Eoferreola* by the colour pattern. Greater part of head, pronotum, mesoscutum and scutellum medially are orange yellow, remaining body is black, wings are black with violet shimmer. The male is unknown. See WAHIS & SCHMID-EGGER (2002) for key of species in the western Palaearctic region.

Description of female: Body length 11 mm. Colour: Orange yellow are: Face below antennal base, except black spot around ocelli, vertex, lower part of gena, pronotum except lateral lower margin, mesoscutum, medial part of scutellum. Antenna dark red with some black, clypeus laterally dark red, otherwise black. Remaining body black, wings black infuscate with violet shimmer. Morphology: General habitus similar to *Eoferreola manticata*. Clypeus apically widely emarginated. Malar space and vertex narrower than midocellar diameter, gena also narrow, ca. 2x midocellar diameter.

Geographic distribution: Southern Oman.

Etymology: The species is named in honour of Dr. Ali Khalfan Al-Wahaibi, assistant professor of Entomology, Department of crop science, Collage of Agriculture and marine science, Sultan Qaboos University, Muscat, Oman.



Figs 61-63: (61) *Eoferreola alwahaibii*, holotypus; (62) *Eoferreola alwahaibii*, face; (63) *Eoferreola alwahaibii*, head laterally.

Zusammenfassung

Die Gattung *Ferreola* wird in der westlichen und zentralen Paläarktis bearbeitet. Ein Schlüssel für die Arten wird erstellt. Die folgenden Arten werden neu beschrieben: *Ferreola alraesii* nov.sp. aus dem Oman und den Vereinigten Arabischen Emiraten, Männchen und Weibchen, Holotypus ist ein Männchen; *Ferreola haladai* nov.sp. aus Uzbekistan und Tajikistan, Männchen und Weibchen, Holotypus ist ein Männchen; *F. pseudodenticulata* nov.sp. aus dem Oman, Männchen und Weibchen, Holotypus ist ein Männchen; *Ferreola tunesiensis* nov.sp. aus Tunesien, Männchen und Weibchen, Holotypus ist ein Weibchen. Die folgenden neuen Synonyme werden vorgeschlagen: *Pseudoferreola incisa* RADOSZKOWSKI, 1888 syn., nov. ist nun *Ferreola algira*; *Pompilus peranceps* RADOSZKOWSKI, 1888 syn.nov. ist nun *Ferreola diffinis*, *Pseudoferreola striata* RADOSZKOWSKI, 1888 syn nov. ist nun *Ferreola orchesica*. *Pseudoferreola barrei* RADOSZKOWSKI 1893 wird in eine neue Gattung gestellt (new combination) und ist nun *Ferreola barrei*. *Eoferreola alwahaibii* nov.sp. aus dem Oman wird in einem Weibchen beschrieben.

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